GEOGRAPHIC SCHOOL BULLETINS

THE NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON 6, D.C.

JANUARY 16, 1961, VOLUME 39, NUMBER 14 . . . *To Know This World, Its Life*

# OUR WARMING WORLD

also —
- ► Spitsbergen
- ► Africa's Languages
- ► Columbia River

UMI

is a nonprofit educational and scientific society established for the increase and diffusion of geographic knowledge.

Ocean-dwellers are changing their feeding grounds. Warm-water fish have been moving up the California coast. Dolphin have been taken recently as far north as Oregon.

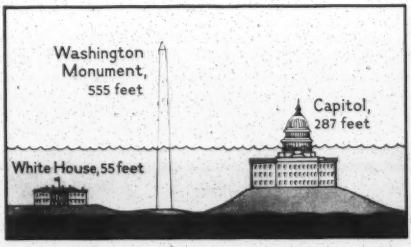
The change is not found solely along coasts. Inland Denver, Colorado, has found that its average annual temperature has risen four degrees in the last 84 years—as has Philadelphia's.

Sweden and Finland can farm higher in the mountains than ever before. Russia reports milder winters. Peru estimates its annual temperature is now eight degrees Fahrenheit higher than it was in 1890.

Such changes may be helpful, but other lands have serious problems. Throughout Africa, large areas are drying up. East African lakes have been shrinking. One expert says the Sahara has been spreading its arid clutch southward at an average rate of a half mile a year.

Scientists differ on the cause of the warming. Some see the change as part of the slow cycle of the Ice Ages, with the ice shifting back toward the poles as it has several times before.

Perhaps the sun has been giving off more heat. Possibly, some climatologists believe, gradual clearing of the atmosphere of dust thrown up by huge volcanic explosions of the past, such as Krakatau (1883) and Katmai (1912), has allowed more of the sun's heat to strike the earth. Other theories tie the change to sunspot cycles.



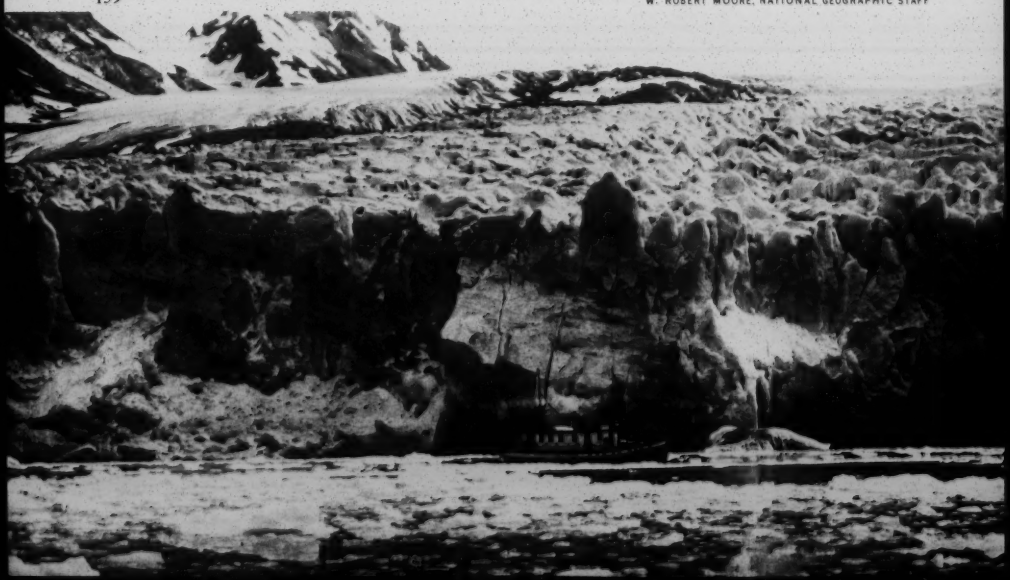

One of the most intriguing theories holds that man himself is making his world warmer. By burning coal, oil, gas, wood, and other materials, man adds more carbon dioxide to the atmosphere. This gas acts something like the glass in a greenhouse. It lets in the rays of sunlight, then holds the radiant heat produced when those rays strike the globe, thus warming the air, which warms Earth.

Will the trend continue? Again, there is dispute. Some scientists predict a century of warmer weather. Others, noting increases in the size of certain glaciers, believe the cycle may have reached its warmest point and is about to reverse itself.

If the warming does continue, our living habits will change during our lifetime, affecting our work, our homes, and our recreations.



W. ROBERT MOORE, NATIONAL GEOGRAPHIC STAFF



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# The World Is Getting Warmer

YOU MAY NOT NOTICE it these wintry days, but our Earth is getting warmer. The change is gradual and there have been short-term reverses, but science is proving grandfather correct: Today's winters are not as cold as those he knew as a boy.

Warmer weather has both advantages and disadvantages.

A New Yorker who awakes to the liquid cadences of the mockingbird, once the avian symbol of the south, or the Canadian wheat grower who finds farming possible 50 miles north of the former limit, may be delighted.

A different view may be taken by a New England waterman who finds tropical crabs threatening his clam beds, or the skier who is forced to go farther and higher to find snow.

The Greenland Eskimo girl salting and stacking codfish below has seen her entire life revolutionized by the climate's change. When seals were plentiful, the Eskimos were self-sufficient. Seals provided meat and skins for clothing and shelter, oil for light and heat.

When warmer weather drove the seals north, this pattern was wrecked. But codfish moved north, too, and became plentiful near Greenland. The Eskimos turned to fishing, which offered income, but not all the uses of the seals. The tribe was forced to convert to a money-based economy.

Icelanders now grow barley on land that has been covered by ice for 600 years. Spitsbergen (see page 161) ships coal seven months of the year instead of the three-month season of 1900.

ANDREW H. BROWN, NATIONAL GEOGRAPHIC STAFF. COVER, EMIL BRUNNER

As the climate of the world changes, the oceans rise. Melting ice in Arctic and Antarctic regions releases enough water to lift sea level an inch in eight years. If the trend continues, some coastal cities eventually may have to build dikes or retreat to higher ground.

The ice of Antarctica alone, if completely melted, would drown the White House and flood the Washington Monument to the 185-foot level (below).

Reid Glacier (bottom) looks cold enough today, but it is only a remnant of a 3,000-foot-deep ice blanket that covered what is now Glacier Bay, Alaska, in 1700.

All forms of wildlife have been affected by the change. Turkey vultures soar in western Massachusetts, where they were not seen 15 years ago. White egrets stalk the Middle Atlantic marshes. In South Dakota and Minnesota, the cardinal flashes at ever more northerly points.



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# Spitsbergen WARMTH THAWS ARCTIC ISLANDS

WARMING OF THE EARTH in the last half century has had a dramatic effect on Spitsbergen, an island group 400 miles north of Norway.

So much land is now free of snow and ice in summer that aerial maps made of the West Virginia-sized territory in the 1930's are out of date. New maps are being prepared.

For Spitsbergen, the warming is an unquestioned blessing. The archipelago is considered cold even by Norwegians. Their official name for it is *Svalbard,* meaning "Cold Coast." Even at sea level, snow may lie on the ground as late as June. By late August, more snow is falling.

But chilly Spitsbergen is attracting tourists. Plans are now being made for regular seaplane service, and engineers are studying possible locations for an airport.

Summer visitors coming by ship see thousands of birds rise at the blowing of a whistle. Terns, puffins, and eiders cry raucously. Whales and walruses loom into sight. Seals sun themselves on ice floes and beaches.

On land, yellow poppies, purple saxifrage, and dwarf willow carpet the ground as snow retreats. Rabbits, reindeer, arctic foxes, and some 70 species of birds are found in the archipelago. Musk oxen were introduced to the islands in 1929.

Spitsbergen is believed to have been discovered by Vikings in 1194, but few Europeans knew it existed until it was rediscovered in 1596 by the Dutch explorer Willem Barents, who was looking for a northeast passage to Cathay. Henry Hudson visited the islands in 1607 and told his London employers about the large numbers of whales, seals, and walruses he saw.

Soon fleets of whaling ships, mostly Russian, began regular visits to Spitsbergen. Eventually they overhunted their quarry, and by the 18th century only a few Russian trappers were left. Norwegian hunters began going to Spitsbergen at the end of the 18th century. A prize catch for them now is a live polar bear cub—worth perhaps $500 to zoo suppliers.

The major industry today is coal mining—thanks to John Munroe Longyear, of Boston, who went to Spitsbergen on a vacation in 1901. The land fascinated him from the moment he saw it:

"It was a grandly desolate, sublime, weird landscape, utterly barren and unlike anything I had ever seen."

EMIL BRUNNER

Continued

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We will buy more convertible automobiles, more lightweight clothing, more gardening gear, fewer snow shovels.

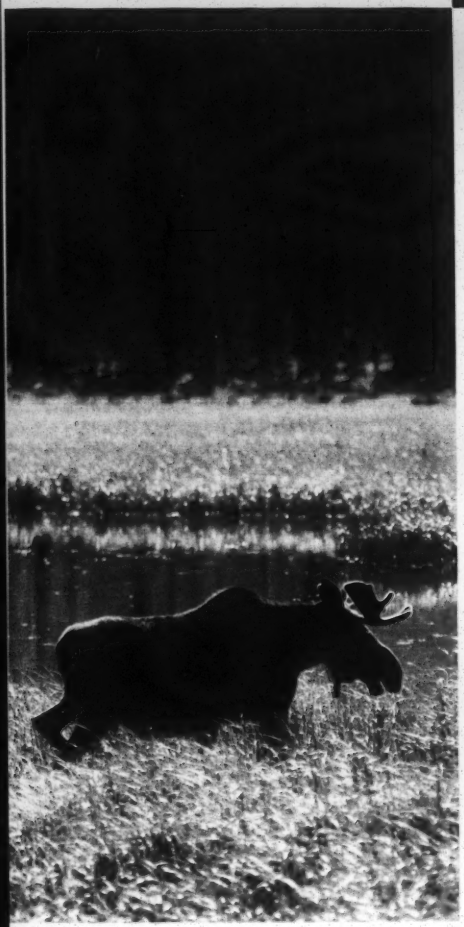
Sales of all types of sports equipment—except skis and ice skates—should rise.

Money saved on snow removal in our cities will be earmarked for more and better parks.

New crops will offer new problems—and new opportunities—to farmers.

Most important, the lengthening of the growing season in the North will offer more food and living space to a hungry, crowded world. F. S.

U.S. NAVY; LEFT, CANADIAN NATIONAL FILM BOARD



## *Animals Extend Their Ranges North*

**One of the first** indications that the world is warming up came to scientists studying wild animals. More and more, the beasts have discovered they can move farther north and be quite comfortable. Among these natural weathervanes are those pictured here—the polar bear, moose, and dolphin. Even trees—which few would think of as migrating—are moving north as their seeds sprout in areas which once were too cold to support them. Farm crops as well are shifting, and some students predict that America's Middle West will someday produce such crops as rice, sugar cane, and cotton. Chicagoans, while happy over reduced fuel bills, may be amazed at the cost of air conditioning.

LUIS MARDEN, NATIONAL GEOGRAPHIC STAFF

Such mining families are the entire population; there are no native Eskimos. The islands are so cold that rivers are of little importance, although in summer they become rushing torrents of snow melt.

Most of the precipitation (about 10 inches of snow a year) grinds seaward in rivers of ice, the glaciers. At their "mouths" these glaciers break off into icebergs to float out to sea and menace shipping.

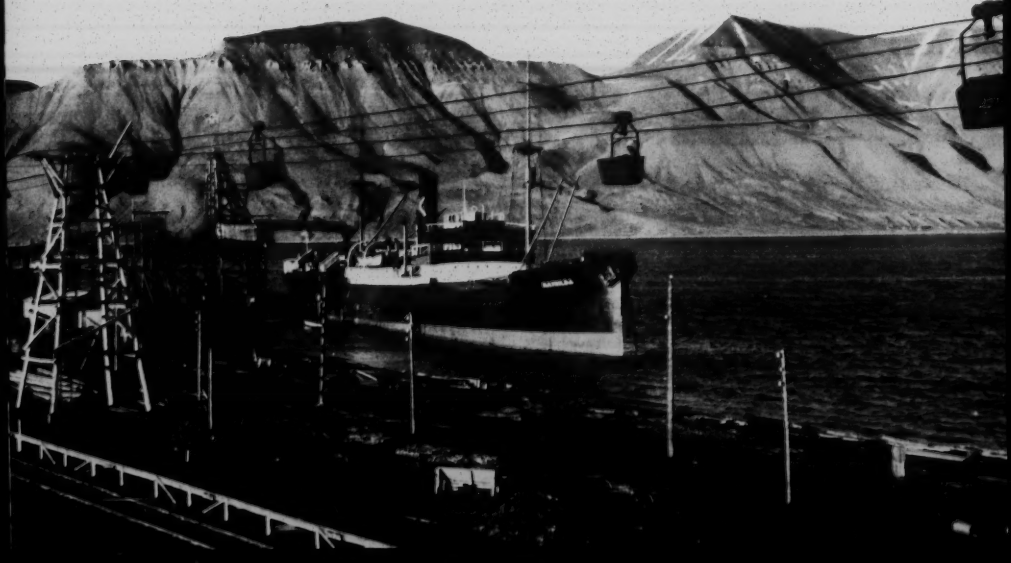
Deep fjords knife into the shorelines; the longest, Is Fjorden, cuts 60 miles into the western part of the largest island, Vest Spitsbergen.

Vegetation today is that of the tundra (see *School Bulletins* February 9, 1959), chiefly moss, with about 130 species of flower plants and a few dwarf trees, although the coal deposits show that in an even warmer period forests flourished.

Since the islands lie about halfway between the North Cape of Norway and the North Pole, they have been a favorite jumping-off place for polar exploration. Salomon August Andrée was killed in 1897 while attempting to reach the Pole by balloon from Danes Island. In 1926, Richard Byrd and Roald Amundsen successfully flew to the Pole and back from Kings Bay. George Hubert Wilkins landed at Is Fjorden in 1928 after a flight from Alaska.



PHOTOGRAPHS BY LENNART NILSSON, BLACK STAR



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*Icy Spitsbergen mines coal to feed the fires of Russia and Norway*

**Coal** from Spitsbergen's mines is among the world's best, with very small percentages of slag and ashes. After being taken from the pits (above) it is carried by cable car (right) to the harbor of Longyearbyen (bottom) for shipment. The deep harbor allows even large ships to pull up to the quay. This vessel, about 5,000 tons, loads in 24 hours, reaches Norway in three and a half days. The harbor is ice-free for seven months.

PHOTOGRAPHS BY LENNART NILSSON, BLACK STAR

Longyear began developing Spitsbergen's coal deposits. Most of its present 2,000 inhabitants are miners. The largest settlement is called Longyear City *(Longyearbyen)*.

Longyear died in 1922. Mining has been continued by Norwegians and Russians. Norway's sovereignty over Spitsbergen was recognized by the League of Nations in 1920, but other nations have equal commercial rights. Only the Soviet Union, however, presently takes advantage of the opportunity in the still cold, but warming, islands.

Mining goes forward under gray skies amid glaciers (see cover). There are very few days of sunshine that allow the island women to hang their clothes to dry (below). Even then, if the wind shifts to blow from the mining tipple in the background, this housewife's work will be lost as swirling clouds of coal dust blacken her linen.

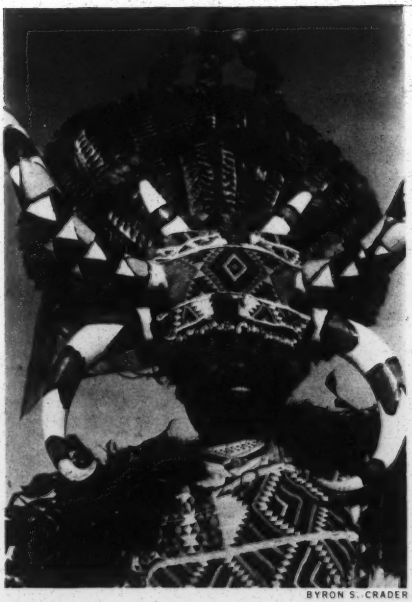
central African forests and such tall, beaded Zulus of the south as the Durban, South Africa, rickshaw boy (right).

However, pockets of the strange "click" language still exist in south Africa. Bushmen and Hottentots speak it, or rather, click it. Some of their sounds resemble a cracking whip.

Each click has a distinct meaning, but intonation can change its sense. A Bushman, for example, may give five meanings to one syllable by pronouncing it with a high, middle, or low tone, or with a rising or falling inflection.

Many African languages rely on tone to convey meaning. If an Ewe of the west coast says *do* in a low voice, he is not starting a musical scale, but expressing "sad." The same word in a middle tone means "sleep"; in a high voice, "say."

Many African languages would twist an American tongue into knots. Chindau of Southern Rhodesia includes the kissing sound of "mwa," the whis-



BYRON S. CRADER

tling-through-the-teeth "sv," and a "q" that sounds like a cork being pulled.

The main language divisions—Semitic (Arabic), Hamitic (Berber), Sudanic, Bantu, Bushman and Hottentot—like the trunks of trees—sprout branches, which, in turn, grow smaller branches. For example, among the many groups of Bantu tongues is a branch called Zulu. In it are included Xhosa, Tebele, Zulu, and Ngoni. Each of these languages has several dialects.

Some Africans speak a language all their own. Timbuktu uses Songhai, unrelated to any other African speech.

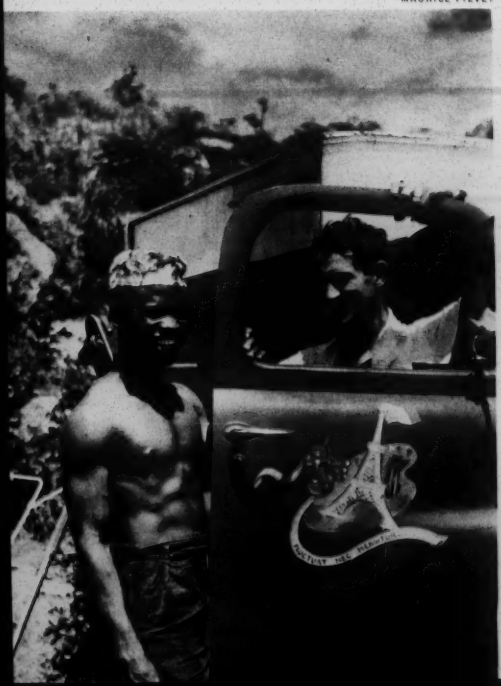
On top of this conglomeration of languages, the colonial powers piled their own: English, French, Portuguese, German, Afrikaans (related to Dutch). Africans who came in contact with the white man picked up his language, or at least a pidgin version of it.

They plucked "humbug" from English and made a verb out of it. "Go 'way, no humbug me," says the cook to a young pest in the kitchen. They took "small" and made it an adverb. "Back up small" gets a car parked. "Palaver" means argument or trouble. "Mammy palaver" is woman trouble.

In many places the local African language is used in the first few grades of school, English or French in the higher grades. L.B.

**Multilingual** Boniface (left), speaking Ibo, Yoruba, Hausa, and English, escorted Maurice Fiévet (right) through Nigeria and the Cameroons to write and illustrate "Beyond the Bight of Benin" in the August 1959 *National Geographic*.

MAURICE FIÉVET





UMI

# AFRICA SPEAKS IN 700 TONGUES

IN SWAHILI, a *mama* is a mama, but a *papa* is a shark. The word for father actually seems more like one for child: *baba*. And *boi* is not a baba's son, but water.

Mama was not borrowed from English, but some Swahili words, like *pensil* (pencil) and *daktari* (doctor) were. Though it is basically an African language, Swahili is seasoned with words from Arabic, Persian, Portuguese, German, English, and the tongues of India.

Babel because its deserts and dense jungles isolate tribe from tribe. In the past, one territory may have been entirely unaware of a next-door neighbor. Even today it is sometimes difficult to get news of Ghana in Nigeria. In the little kingdom of Buganda, people often seem unaware that other Africans live outside their borders.

Political unity expands today in Africa, but language unity does not keep pace. In Ghana, with 5 million people,

LOWELL THOMAS, JR.

PET TURNER

CONSTANCE STUART, BLACK STAR

Spoken by some 10 million people in East Africa, Swahili has a written literature and even a translation from French of some of Molière's comedies.

Swahili is one of the more than 700 languages of Africa, which include Bobangi, Gã, Yoruba, Ibo, Sutu, Umbundu, Fanti, Zulu, Maba, Mimi, Sandawe, Chikaranga, Twi, Fõ, Fur, Guang, Vai, Fula, Luba, Xhosa. Should the three people in the pictures above happen to meet, they would have trouble just saying "hello." The Cairo girl (above center) reddens lips that speak Arabic. The Pygmy (left) in the Republic of the Congo speaks Kibira or Kilesi, dialects of his Negro neighbors. For marketing he uses Kingwana, a corruption of Swahili and trade language of eastern Congo. The girl of a Bushman tribe, at Lehututu, in the Kalahari Desert, Bechuanaland (above right), speaks a language made up mostly of clicking sounds.

The continent resembles a Tower of

English is the official language, but Radio Ghana broadcasts in six tongues.

North of the bleak Sahara, Arabic and Berber are the main languages. In the 7th century, the Arabs swept out of the Arabian Peninsula and added a slice of Africa to their empire. To it they gave their language. Many Berbers, a farming and herding people, fled to the highlands of the Atlas Mountains or the desert and retained their own customs and tongue. Hausa, a lingua franca spoken by some 15 million people from Sierra Leone to Lake Chad, is a relative of Berber.

Between the desert and the equatorial jungles stretches a band of grassland. Here the people speak the many Sudanic tongues: Vai, Susu, Balante, Grusi, Bobo, Gurma, Ekoi, Bamileke, Bambara, Malinke, Yoruba, Ewe, Ibo, and others.

Where the tropical jungles begin, so does the great Bantu family of 83 languages spoken by the Pygmies of the

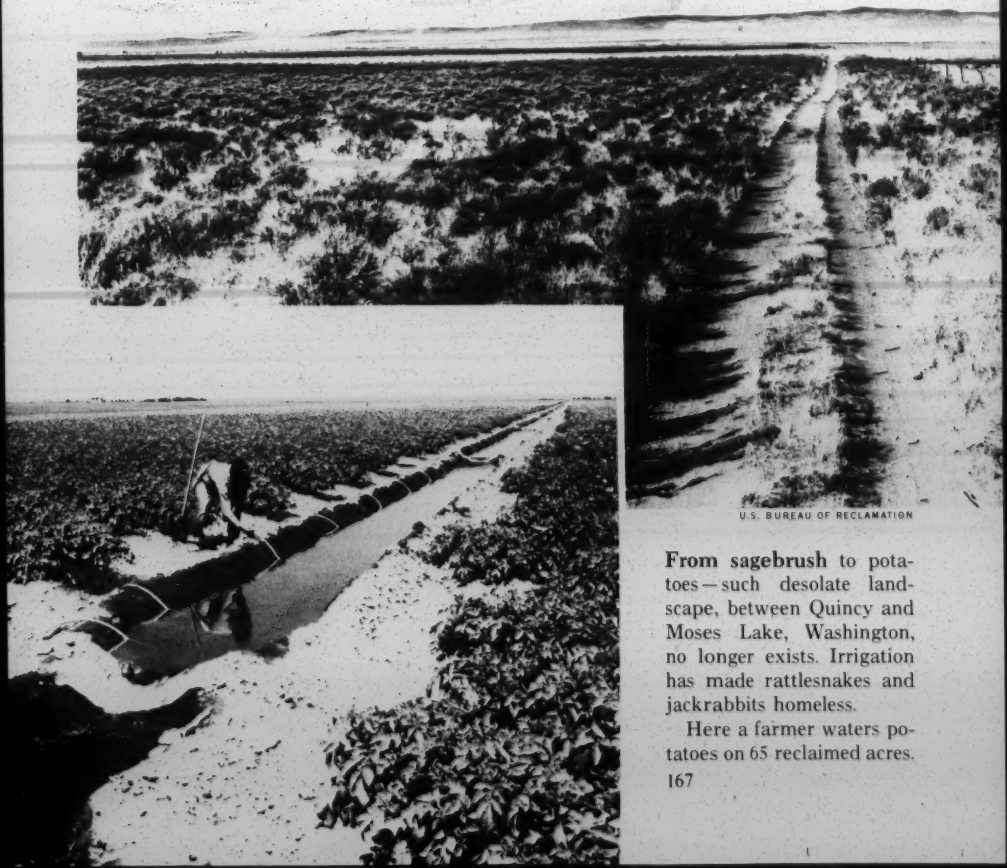
courses, the mighty stream seems unable to make up its mind on a route. First it races north, toward the Arctic, for more than 200 miles. Then, swinging around the Selkirks, it plunges south, bypasses Puget Sound. Finally it turns west to form part of the Oregon-Washington border before it meets the sea.

Collecting the waters of tributaries, gaining momentum, the angry, swirling currents drain a basin of 259,000 square miles in Canada, Montana, Wyoming, Idaho, Washington, Oregon, Nevada, and Utah (220,000 square miles within the United States).

Its lower reaches already work for man. The river turns the turbines that mean power for factories. It sends its water into irrigation canals to wet a thirsty agricultural empire. It backs up into lakes to carry tugs, barges, and pleasure craft.

A new agreement between the United States and Canada will make it possible to harness the upper reaches, where between the Columbia's banks flows 40 per cent of the potential hydroelectric power of the United States. The two countries have agreed on terms for a treaty that will launch a multimillion dollar program of river development. The project, aimed at completion by 1970, will mean the residents of Bonners Ferry, Idaho, need not fear periodic flooding. Farms in British Columbia will get low-cost electricity. Crops will replace sagebrush in many sections of the basin.

Canada will build three major water-storage dams on its side of the border. These will make possible a steady flow for United States power projects down-



U.S. BUREAU OF RECLAMATION

**From sagebrush** to potatoes—such desolate landscape, between Quincy and Moses Lake, Washington, no longer exists. Irrigation has made rattlesnakes and jackrabbits homeless.

Here a farmer waters potatoes on 65 reclaimed acres.



UMI

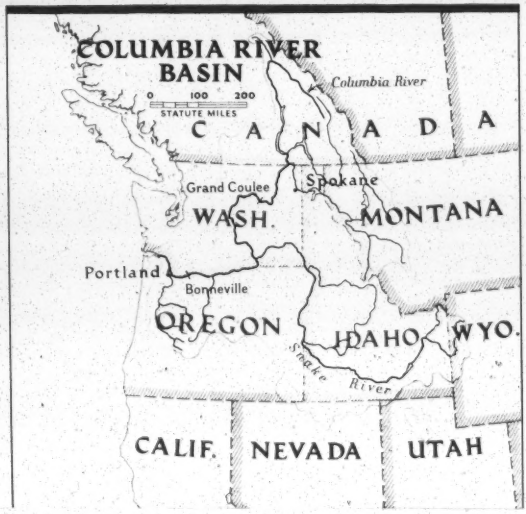
U.S. BUREAU OF RECLAMATION BY FRANK POMEROY

**Key to success** in the Northwest: Grand Coulee Dam. Begun in 1934, Grand Coulee now harnesses the Columbia River. It irrigates the million acres of thirsty desert in the Columbia Basin Project. It shoots power into homes and industries and enables scientists at nearby Hanford to develop a new kind of power: atomic energy.

It is the largest concrete dam and the biggest single source of water power in the United States. Spreading 4,173 feet wide and rising 550 feet high, the dam consumed 10,585,000 cubic yards of concrete: enough to lay a four-lane highway from New York City to Seattle, Washington. Its spillway is twice as high as Niagara Falls. Behind it, the Columbia backs up to form Franklin Delano Roosevelt Lake, stretching 151 miles to the Canadian border.

UNITED STATES, CANADA WILL WREST NEW POWER FROM . . .

# The Mighty Columbia



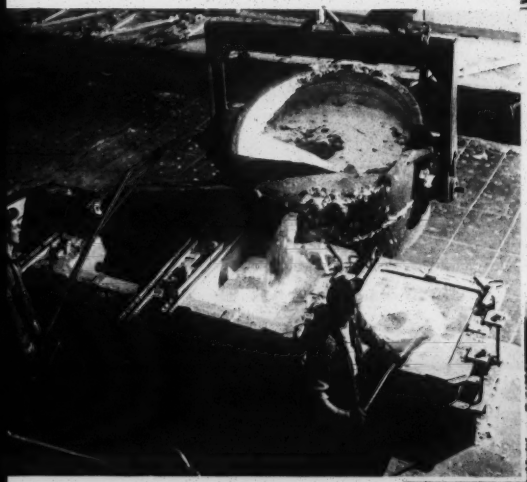

ON THE ROOF of North America, in southeastern British Columbia, cold, blue Columbia Lake nestles between the white-wigged Canadian Rockies on the east and the Selkirk Mountains on the west. Its calm waters start the giant of western rivers, the Columbia, on its insane path to the sea.

Legend says Paul Bunyan's big blue ox, Babe, carved the river when in a fit of temper he ran away with the plow and dashed from mountains to sea. From its source to the Pacific Ocean, 1,214 miles away as the Columbia

stream. In return the United States will transmit to Canada half the increase of power thereby derived. Also the United States will build Libby Dam on a tributary of the Columbia, the Kootenai.

The Columbia and its tributaries have served man for a long time. Even before the white man entered the Northwest, Indians plucked salmon from its waters, hunted on its banks, even diverted its flow to irrigate land for primitive agriculture. White trappers, explorers, and missionaries used it as a wilderness highway.

WEYERHAEUSER TIMBER COMPANY



**Out of the river,** a Bunyanesque Empire—The Columbia turns sawmills at Longview, Washington, above, and powers aluminum plants near Spokane at Mead, Washington, left. Spokane, straddling the Spokane River, below, takes electricity from its own river and the Columbia for meat-packing plants, automobile factories, and paper mills.

RAY ATKESON, LEFT, CAL-PICTURES

The empire the river basin could become was not immediately apparent. Although the land is fertile east of the rain-catching Cascade Range, rainfall measures less than 10 inches a year, enough to nourish only tangles of sagebrush. An Army engineer who surveyed the basin in 1879 declared: "It is a desolation where even the most hopeful can find nothing in its future prospects to cheer."

He has since been proved wrong. Water from the many dams—headed by Grand Coulee—has turned millions of empty acres into wheat fields, orchards, gardens.



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